Kolloquium Mechanik

RUHR-UNIVERSITÄT BOCHUM

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Vortragsankündigung

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Thema:
ON SPATIAL AND MATERIAL SETTINGS OF CONTINUUM THERMODYNAMICS

Ort:
Universität Dortmund
Hörsaal HS1, Maschinenbaugebäude
Campus Nord, Leonhard-Euler-Str. 5

Zeit:
Mittwoch, den 09.01.2002
15:00 Uhr

Inhalt:

Conceptually, in the spatial setting of continuum thermodynamics we consider the response to variations of spatial placements of 'physical particles' with respect to the ambient space, whereas in the material setting of continuum thermodynamics we consider the response to variations of material placements of 'physical particles' with respect to the ambient material. Thus the former establishes (newtonian, mechanical) forces that drive 'physical particles' through the ambient space whereas the latter establishes (eshelbian, configurational) forces that drive 'physical particles' through the ambient material.

Here the relevant relations pertaining to continuum thermodynamics are developed in spatial and material setting. These are besides the kinematics essentially the appropriate formulations of the balance of momentum and the resulting balance of kinetic energy for the mechanical part and the balances of energy and entropy for the thermodynamical part. The attempt is here to mirror the thermodynamics underlying the spatial setting by the corresponding thermodynamics of the material setting. Thus a number of interesting and new relations between the two settings or rather motion problems, that would have been overlooked otherwise, are discovered.

Summarizing, the main aim of this work is twofold: on the one hand to highlight the intriguing duality of the spatial and the material setting of continuum thermodynamics and on the other hand to provide the necessary tools for an elegant transition between these two settings. Thereby, the underlying strong interest of the material setting rests in particular in the interpretation of the corresponding material forces as the thermodynamical driving quantities for the motion of general defects relative to the ambient material.

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